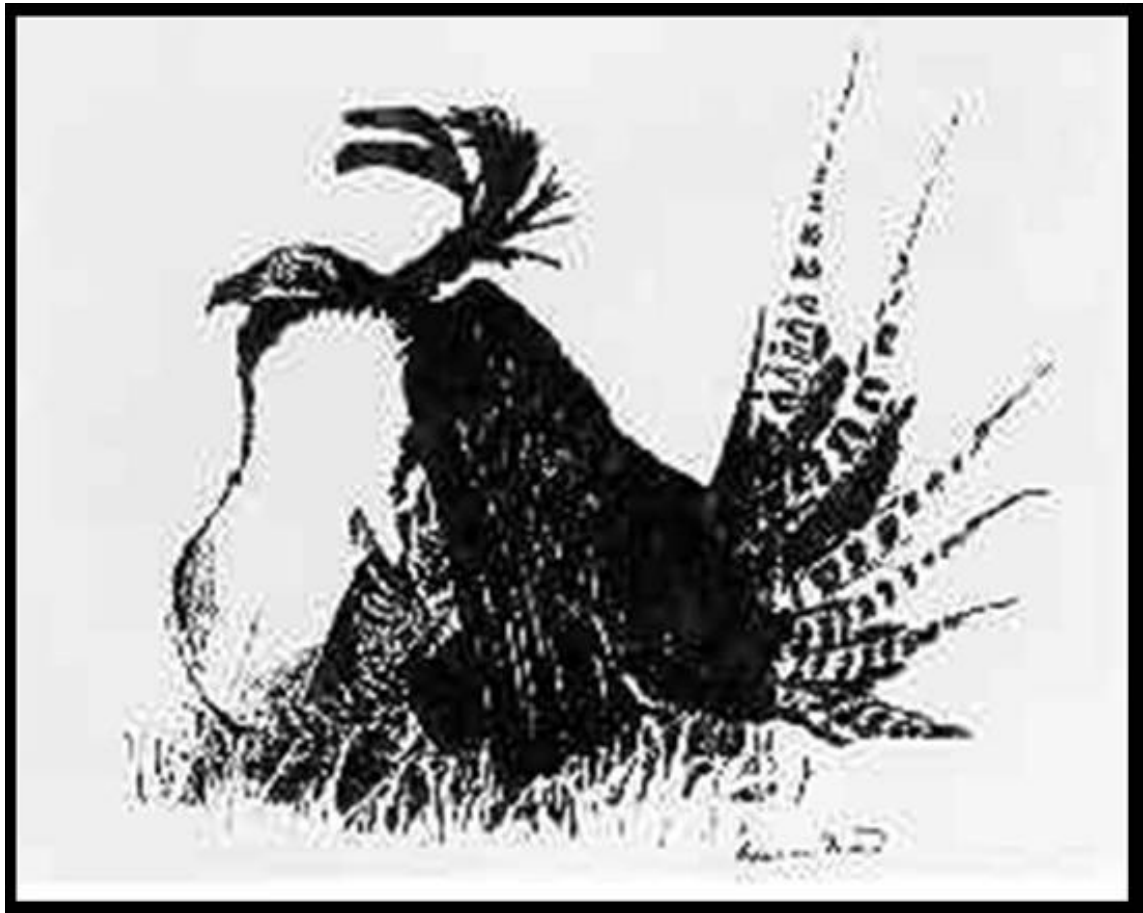


Gunnison Sage-grouse

(*Centrocercus minimus*)

2000-2002 Conservation Plan Progress Report

San Juan County, Utah



December 2003

PREAMBLE

The Gunnison Sage-grouse (*Centrocercus minimus*) inhabits a limited area in Colorado and Utah. San Juan County (SJC) is the only place in Utah where Gunnison Sage-grouse populations are currently known to occur. On January 26, 2000 the U.S. Fish and Wildlife Service (USFWS) received a petition signed by representatives of the American Lands Alliance, Net Work Associates, The Larch Company, Biodiversity Legal Foundation, Wild Utah Forest Campaign, and Sinapu requesting an emergency listing for the Gunnison Sage-grouse under the Federal Endangered Species Act. The petitioners cited increasing habitat fragmentation, reduced and limited population distributions, and low and declining localized populations as the primary reasons for classifying the species as endangered. Prior to receiving the petition, the USFWS had designated the species as a candidate for listing.

The San Juan County Gunnison Sage-grouse Working Group (SWOG) was formed in 1996 for the purpose of developing a conservation plan that could be implemented by state and federal wildlife resource agencies, private landowners, and local governments to benefit sage-grouse populations in the county. The conservation plan was finalized and signed in November 2000. This progress report identifies conservation strategies delineated in the conservation plan that have been accomplished since SWOG was organized and the plan was signed.

Table of Contents

	Page
PREAMBLE	ii
TABLE OF CONTENTS.....	iii
LIST OF FIGURES AND TABLES.....	iv
I. PLAN BACKGROUND.....	1
II. PLAN DEVELOPMENT- POPULATION/HABITAT CONSERVATION ASSESSMENT	3
III. PLAN IMPLEMENTATION - CONSERVATION STRATEGIES	9
IV. APPENDICES	17
A. San Juan County Gunnison Sage-grouse Working Group Members.....	18
B. San Juan County Gunnison Sage-grouse Vegetation Classifications and Definitions.....	19
C. Summer Ecology of Gunnison Sage-grouse (<i>Centrocercus minimus</i>) in San Juan County, Utah 2001-2002	22
D. Summary of 2000-2002 Gunnison Sage-grouse Conservation Projects and Costs.....	28

List of Figures and Tables

Figures

Figure 1. Gunnison Sage-grouse Conservation Area. San Juan County, Utah.....	2
Figure 2. Gunnison Sage-grouse spring and summer locations, San Juan County, Utah, 2001-2002	8
Figure 3. Gunnison Sage-grouse Working Group conservation projects, San Juan County, Utah, 2002.....	16

Tables

Table 1. Landownership in the Gunnison Sage-grouse Conservation Area	1
Table 2. Number of strutting Gunnison Sage-grouse males counted on leks in San Juan County, Utah, 1970-2002.....	4
Table 3. Breeding complex vegetation types, Conservation Study Area, San Juan County, Utah, 2000-2002	6

I. PLAN BACKGROUND

A. Purpose

The San Juan County Gunnison Sage-grouse Working Group (SWOG) was formed in 1996 to identify and implement conservation strategies to reverse the decline of sage-grouse populations in the county. From the onset, SWOG has sought local citizen involvement and input. SWOG consists of public natural resource management agencies, local governments, private landowners, local citizens, and private conservation groups. A current list of SWOG members can be found in Appendix A.

SWOG believes that implementation of the conservation plan will ensure local ownership in future management and land-use decisions, respect private property rights, and embrace community economic, cultural, and social values while conserving the Gunnison Sage-grouse.

This progress report identifies conservation strategies delineated in the conservation plan that have been accomplished since SWOG was organized and the plan was signed. SWOG believes the actions implemented by private and public partners in SJC will help to restore Gunnison Sage-grouse habitats and populations while benefiting the local economy and community.

B. Conservation Area Description and Boundary

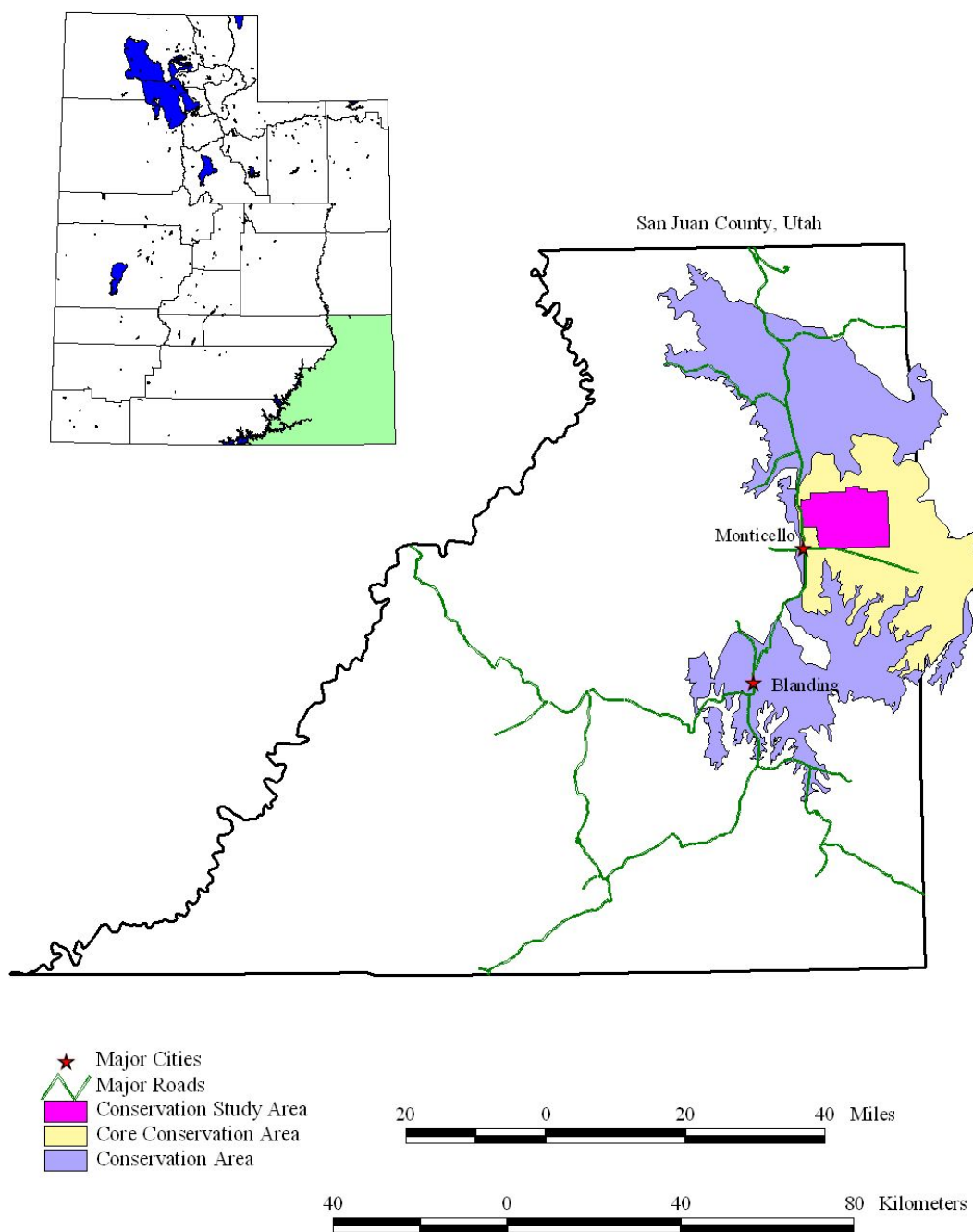
The San Juan County Gunnison Sage-grouse Conservation Area (CA) boundary was delineated using current and historic habitats, sage-grouse observations, and an assessment of the potential for remaining sagebrush areas in the county to provide suitable habitat (Figure 1). The CA encompasses rural areas, rural residential dwellings, and agricultural croplands (Table 1). The CA area consists of 847,885 acres. Thirty-seven percent (314,244 acres) is privately-owned. Within the CA, SWOG has delineated a core conservation area (CCA) consisting of 336,680 acres of which 89% (218,493 acres) is privately-owned. Within the CCA, SWOG has identified a conservation study area (CSA). The CSA consists of 59,744 acres. Over 93% (55,738 acres) of the CSA is privately-owned. SWOG make no inferences regarding habitat potentials for the entire CA. The entire CA does not presently support Gunnison Sage-grouse.

Table 1. Landownership in the Gunnison Sage-grouse Conservation Area.

Area	Total Acres	Forest Service	BLM	State	Tribal	Private	% Private
CA	847,885	195	457,333	65,271	10,862	314,224	37
CCA	246,811	-	24,835	3,483	-	218,493	89
CSA	59,681	-	3,024	919	-	55,738	93

CA – Conservation Area, CCA – Core Conservation Area, CSA – Conservation Study Area

Figure 1. Gunnison Sage-grouse Conservation Area, San Juan County, Utah.



C. Process

Gunnison Sage-grouse in the county depend heavily on private lands for habitat (Table 1). Thus, SWOG is committed to conserving and enhancing Gunnison Sage-grouse populations that occur on privately-owned land in the county and contribute to the economic viability of farms, ranches, and the local community. Landowner involvement in the SWOG Conservation Plan (PLAN) is strictly voluntary.

The PLAN consists of two parts. The first part is the Population and Habitat Conservation Assessment. This section describes SWOG's current understanding about the status of Gunnison Sage-grouse distributions, habitat conditions, and factors that may be affecting populations in the county. Research is ongoing to refine this information and new information is included in this progress report. The second part of the PLAN is the Conservation Strategy. It further identifies PLAN goals and objectives, conservation strategies, implementation schedules and responsibilities, evaluation guidelines, and monitoring requirements.

The PLAN identifies conservation strategies to be implemented in guiding and coordinating management efforts across jurisdictional/land ownership boundaries to improve Gunnison Sage-grouse habitat conditions in the county. SWOG intended that the PLAN be a dynamic document. As new information is obtained or issues identified, SWOG updates the PLAN and modifies conservation strategies accordingly. The purpose of this progress report is to summarize efforts made from 2000-2002 to implement conservation and management strategies identified in the PLAN.

II. PLAN DEVELOPMENT - POPULATION/ HABITAT CONSERVATION ASSESSMENT

In 1972, 175 males were counted strutting on six leks and the population was estimated to be between 583-1050 birds in SJC. By 1999 lek counts had dropped to 43 males on four leks.

In 2001 and 2002, 47 and 35 males, respectively, were counted on five and four leks, respectively (Table 2). Based on count data from 2002, the population was estimated to be between 178-308 birds.

A. Population Objectives

1. Minimum population size

Reestablish a minimum estimated spring breeding population of 500 birds with 6-8 active leks each containing a three-year count average of 20-25 males per lek. This increase would be measured from 1997 population estimates.

Table 2. Number of strutting Gunnison Sage-grouse males counted on leks in San Juan County, Utah, 1970-2002.

YEAR	RORING	STRUTTING EAST SEEP	GROUND HICKMAN FLAT	BLM	DODGE POINT
1970	49	43	9		
1971	51	61	2		
1972	59	64	6		
1973	48	31	7		
1974	41	73	4		
1975	27	51	21		
1976	24	32	33		
1977	18	40	50		
1978	13	30	45		
1979	5	17	39		
1980	4	9	28		
1981		21	39		
1982	2	18	27		
1983	9	15	35		
1984	10	13	28		
1985	7	9	16		
1986	9	6	3		
1987	10	8	3		
1988	11	6	4		
1989	16	11	3		
1990	15	9	4		
1991	11	8	5		
1992	16	14	6		
1993	17	18	3		
1994	18	17			
1995	16	14	8		
1996	14	14			
1997	13	6	6		
1998	15	4	9	4	
1999	22	1	9	6	5
2000	33		12	4	8
2001	25	3	12	4	3
2002	23	0	8	3	1

Status

In 1997 the population, based on lek surveys, was estimated to be between 125-140 birds. In 1998 and 1999 SWOG increased lek search efforts and discovered two new lek sites. In 2002, the population was estimated to be between 175-308 birds based on counts of four leks. The increase in population size observed in 2002 may reflect increased search efforts and not an actual increase in population size. Only the Roring lek, achieved the 20-25 male average. The increased number of males counted on this lek may have been the result of birds abandoning the East Seep Wash lek. The 2002 population estimate was 192-325 birds below the minimum desired population objective. The intent of the PLAN is to achieve this population goal by 2012.

2. Lek protection

Protect all current identified lek sites from future risk through leases, conservation easements, or in fee title.

Status

Currently, two of the leks are protected. These include the Bureau of Land Management (BLM) lek (owned in fee title by the BLM) and Hickman Flat lek (part of a perpetual conservation easement on the Adams property owned by the Utah Division of Wildlife Resources (UDWR)). UDWR and BLM are pursuing conservation easements on other lek sites.

B. Habitat Objectives

1. Breeding complexes

Reestablish desired vegetation conditions on 50-75% of the areas located within two miles of lek sites. SWOG has defined desired vegetation conditions to include a canopy cover of 20-40% big sagebrush with an average height of 16 inches, 30% minimum grass canopy cover, and 10% minimum forb canopy cover.

Status

In 2001 and 2002, 14 Gunnison Sage-grouse were captured and fitted with radio-collars (8 males and 6 females). Movements of the birds were monitored during the spring and summer. Based on bird movements, a conservation study area (CSA) was delineated. The CSA consists of 59,744 acres (Figure 1). This area contains sage-grouse primary breeding complexes. Monitoring of radio-collared birds to determine seasonal habitat use areas is currently being conducted.

Existing vegetation conditions in the CSA have been evaluated. This evaluation was conducted by ground truthing Landsat imagery of the CSA. To ground truth the imagery, 50 training sites within the CSA were randomly established in 2001. These sites were visited and the vegetation conditions documented. Definitions for the vegetation classifications can be

found in Appendix B. After completing this fieldwork, a supervised classification of the imagery was conducted (Table 3).

Table 3. Breeding complex vegetation types, Conservation Study Area, San Juan County, Utah, 2000-2002.

Vegetation Classification	Acreage	% Total*	Objective
Non-irrigated Agriculture	4688	17.7	
Black-sagebrush	4287	16.2	
Big Sagebrush > 25 % Canopy	1523	5.7	
Big Sagebrush < 25% Canopy	1706	6.4	20-40%
Grass (Conservation Reserve Program)	13,533	51.1	30%
Rangeland	2908	10.9	

*These totals are based on 100% of the breeding complex area. The PLAN calls for achieving the objectives on 50-75% of the breeding complex area.

Currently the big sagebrush acreages available in the breeding complex do not meet the PLAN objectives.

2. Brood-rearing complexes

The PLAN identifies the need to reestablish brooding-rearing complexes in the CSA. This will be done by enhancing vegetation conditions on 50-75% of the area located within four miles of known lek sites over a 10-year period. This area consists of 80,551 acres. Desired conditions include a canopy cover of 20-40% big sagebrush with an average height of 16 inches, 30% minimum grass canopy cover, and 10% minimum forb canopy cover. The height of the vegetation in wet meadow areas is to be greater than four inches between June 15 - July 31 on over 75% of the area considered to be brood-rearing habitat.

Current Status

Based on LandSat imagery, the CSA meets the desired objective percent cover for grass (Table 3). In 2002, vegetation composition in the brood-rearing areas was measured. Percent shrub, forb, and grass composition in the brooding-rearing areas were measured at 11%, 9%, and 31%, respectively. The 9% forb measurement approximates the 10% PLAN objective.

3. Wintering complexes

Reestablish desired vegetation conditions on 50% of the areas located within the CCA, and 25% of the vegetation conditions within the buffer areas, over a 10-year period. Desired conditions for winter habitat include a minimum of 15% canopy cover of big sagebrush vegetation that averages 12 inches in height on southerly and westerly aspects. Big sagebrush in drainages should exhibit a minimum of 30% canopy cover and average 20 inches in height. Small areas that exhibit denser sagebrush canopy cover (40% with an average height of 16 inches) should be interspersed throughout the wintering areas on south and west slope aspects.

Status

Winter habitat within the CSA will be assessed in 2002-2004.

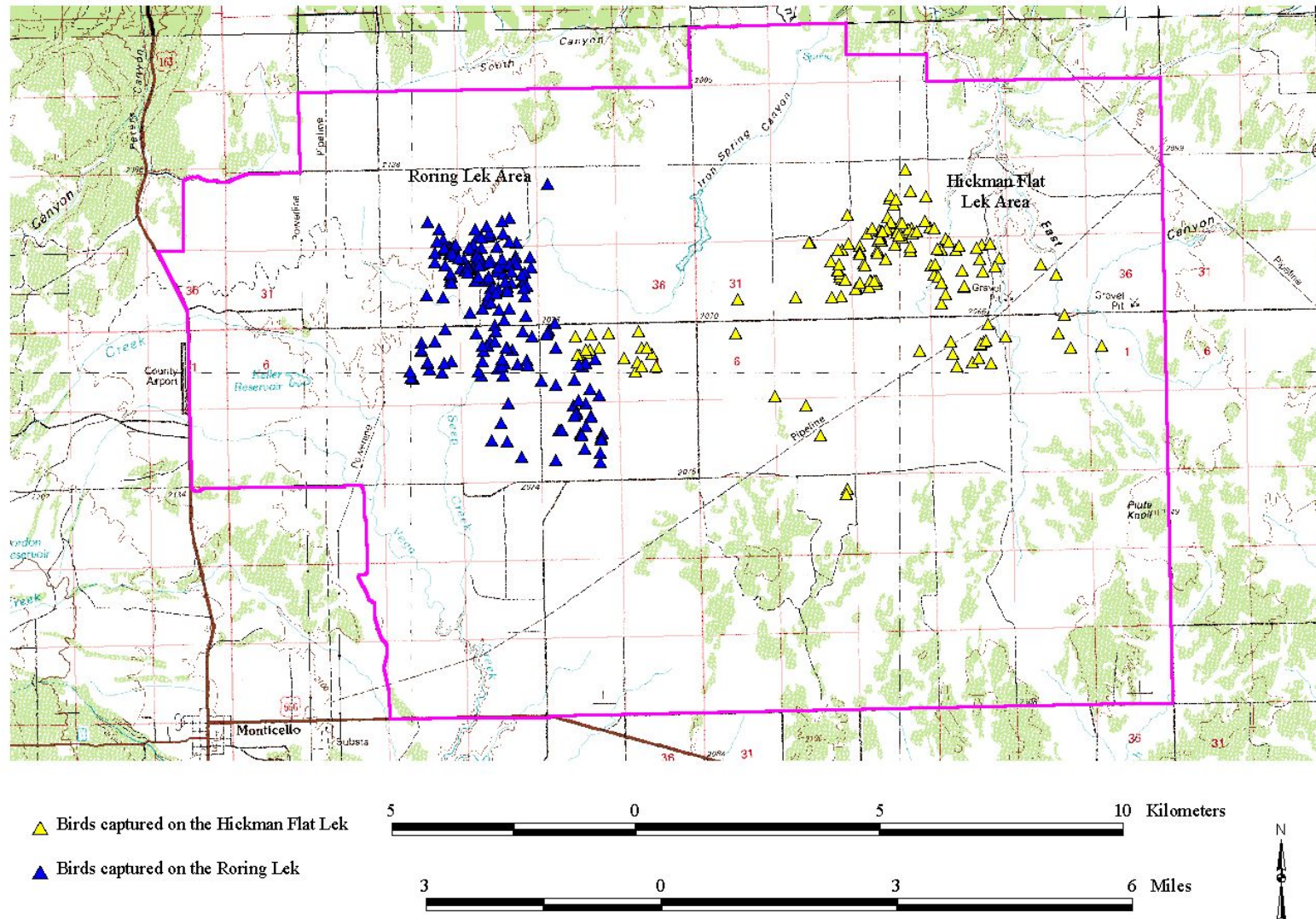
4. Corridors

Reestablish and maintain contiguous travel corridors consisting of big sagebrush exhibiting >25% canopy coverage between breeding, brood-rearing, and wintering complexes in the CCA. This objective is to be achieved within 15 years.

Status

Information gathered from Gunnison Sage-grouse habitat-use studies is being used to identify and map corridors used by the SJC population to move between seasonal habitats. Based on summer movements of adult males, adult hens, and juvenile hens there appears to be little or no population interchange between birds who frequent the Roring lek site located in the western part of the CSA and birds who use the Hickman lek complexes in the eastern part of the CSA (Figure 2). However, data obtained from January 2003 telemetry locations to determine winter habitat use indicate that two birds from the Roring lek have moved in close proximity to birds from the Hickman Flat lek. Additional effort will be conducted in fall 2003 to capture juvenile males. Juvenile males are more likely to disperse to new lek sites.

Figure 2. Gunnison Sage-grouse spring and summer locations, San Juan County, Utah, 2001-2002



III. PLAN IMPLEMENTATION - CONSERVATION STRATEGIES

A. Desired Plan Outcomes

SWOG anticipates that implementation of the PLAN will result in a broad base of local support necessary to coordinate management across land ownership and jurisdictional boundaries to ensure survival of the Gunnison Sage-grouse. To achieve this outcome, the PLAN has been designed to be a dynamic document that will be formally reviewed annually and updated as new information becomes available. Annual progress and quarterly reports have been provided to SWOG members.

The success of this PLAN will be measured by changes in habitat conditions and Gunnison Sage-grouse population numbers in SJC. Another measure of success will be increased participation of local governments, local landowners, the community, resource management agencies, and non-governmental conservation organizations in conservation actions.

B. Conservation Strategies

The strategies identified in the PLAN will be implemented and evaluated by SWOG. Although the strategies may be applied to approximately 336,680 acres identified as the CCA, priority will be placed on areas within the 59,744 acre CSA. The CSA contains essential Gunnison Sage-grouse breeding, nesting, brood-rearing and wintering habitats.

C. Implementation of Conservation Strategies Identified in the PLAN

1. Develop public support and funding base for the conservation plan.

Action: Communicate Conservation Plan goals, objectives, and accomplishments to other stakeholders in the agricultural, natural resources, and legislative community.

Strategies: Publish a SJC Gunnison Sage-grouse Conservation Plan informational brochure for public distribution.

Status: An informational brochure describing the conservation planning efforts was printed and distributed in 2001.

Host media interviews with SWOG representatives from the agricultural and wildlife conservation communities.

Status: SWOG members have been interviewed by local newspapers, the Salt Lake Tribune, Deseret News, and other media outlets.

Organize and conduct an annual SJC Gunnison Sage-grouse Conservation Festival to increase public awareness and support for local community efforts to restore populations.

Status: The Gunnison Sage-grouse Festival concept has been postponed until SWOG is able to assess the effects of increased public visitations on lek attendance. The UDWR in cooperation with Utah State University (USU) has hosted small group tours and lectures about Gunnison Sage-grouse conservation. The small, unadvertised tours appear to be meeting the demand for viewing the birds.

Develop a series of promotional items that carry a designer logo. These promotional items will be sold at local and regional retail outlets to increase the visibility and support of the county conservation efforts and generate revenue to support PLAN implementation.

Status: A local designer was contacted about developing a logo that could be used on caps and other apparel. Three dozen caps were embroidered with the logo and distributed to local landowners. In addition, we contacted a company known as Rag Bag Acroworks, Inc. (www.ragbagacroworks.com) to develop additional promotional items. The company currently has a series of promotional clothing available that can be ordered on-line.

SWOG partners will contact their legislative representatives regarding the process and send letters of support to the executive director of the Department of Natural Resources, the Utah Governor's Office, and Utah's congressional delegation.

Status: SWOG members have contacted legislative and congressional representatives. Copies of the signed plan have been distributed to local legislators, the Utah Governor's Office and Utah's Congressional delegation. SWOG members have written letters to the Executive Director of the Utah Department of Natural Resources to support the use of Utah Endangered Species Mitigation Funds to support the Adams conservation easement. Funding was received from the Endangered Species Mitigation Fund to support the easement. A copy of this progress report will be provided to elected officials.

SWOG representatives will testify before the appropriate Utah Legislature committees about the SJC Conservation Plan to increase legislator awareness and support for similar efforts in other areas of Utah.

Status: See above comments.

2. Monitoring and Evaluation

Action: Seek endorsement and funding of the SJC Gunnison Sage-grouse Conservation Plan through the Utah Department of Natural Resources Endangered Species Mitigation Fund, the Utah Legislature, and other sources.

Strategies: SWOG meets as a working group every six months to review PLAN progress and implementation.

Status: SWOG has met seven times since the Conservation Plan was signed. The local working group uses the meetings to discuss conservation activities and plan future activities.

Action: Monitor impacts of conservation strategies on sage-grouse habitat and population.

Strategies: SWOG will initiate an ongoing research program to monitor annual sage-grouse population numbers and trends, monitor sage-grouse habitat use, nest success, mortality, and identify land use actions which may conflict with the goals and objectives of the PLAN. This work began in 2000.

Status: Graduate students from USU have been monitoring Gunnison Sage-grouse populations and habitat-use patterns in response to management actions. The results of this research are reported in Appendix C and other reports. USU will continue this monitoring effort. The work is supported by funds provided by the UDWR, BLM, Quinney Professorship for Wildlife Conflict Management, USU Extension Services, and the Jack H. Berryman Institute (BI).

3. Species protection and population enhancement

Action: Monitor landscape sage-grouse habitat conditions to include land use and vegetation changes in the conservation area.

Strategy: USU will update the existing GIS land use database of the CA landscape vegetation and habitat conditions every five years. This update will allow SWOG to compare pre- and post-PLAN time periods to inventory and map habitat changes that resulted because of conservation strategy implementation.

Status: This work is ongoing. In this progress report, we describe changes in vegetation conditions that have occurred since 1998.

Action: **Delineate and map all lek sites within the conservation area, monitor numbers of strutting cocks, estimate population numbers and trends, and determine priority brood-rearing and wintering complexes.**

Status: This work is ongoing. Results are described in this progress report.

Strategy: **Conduct annual lek, brood, and winter surveys. Priority areas identified will be added to the SWOG GIS data base. GPS locations of all nesting, brood-rearing, and wintering complex will be recorded and sites delineated on the SWOG GIS data base.**

Status: This work is ongoing and has been described in this progress report.

Action: **Increase the abundance and distribution of Gunnison Sage-grouse.**

Strategies: **Enhance sage-grouse habitat conditions (see restoring and improving habitat quality section).**

Status: This is reported on in the habitat section. Completed projects are listed in Appendix D.

Implement a predation management program.

Status: For fiscal year (FY) 2001, USDA Wildlife Services (WS) removed 21 coyotes prior to the sage-grouse breeding season. During this same period DRC-1339 treated eggs were placed throughout the CCA to protect the birds from Raven predation. In FY 2002, WS removed 46 coyotes and placed 291 DRC-1339 treated eggs. The eggs were placed in draw stations to attract Ravens. Also, SJC offered a bounty on coyotes in 2001 and 2002.

Currently, the adult Gunnison Sage-grouse being monitored exhibit high survival rates. It is uncertain if the high survival rates are the consequence of the predation management efforts.

Reintroduce sage-grouse obtained from Colorado into restored habitats.

Status: SWOG has discussed this option with Colorado. The merits of this action are being assessed and prioritized in the range-wide conservation assessment that is being drafted.

4. Restoring and Improving Habitat Quality

Action: **Develop a vegetation management PLAN for the CCA.**

Strategies: **Identify and GIS map existing and potential nesting, brood-rearing, wintering areas, and travel corridors to include land ownership.**

Status: USU is continuing to do this work.

Work with SWOG partners to manage the core and buffer areas to achieve defined sage-grouse habitat objectives.

Status: SWOG partners have completed a number of habitat projects (Figure 4). These projects include planting sagebrush seed, rabbitbrush treatments on the Adams easement and the development of guzzlers and sprinkler systems to provide water sources and wet meadow habitats. Monitoring Gunnison Sage-grouse use of the water developments continues. In 2002, USU purchased two remote sensing cameras to document bird use and other activity at the watering facilities.

A complete list of the projects and associated costs can be found in Appendix D.

Work with SWOG partners to develop and implement grazing management plans to achieve Gunnison Sage-grouse habitat objectives.

Status: In early 2002, the state of Utah declared a drought emergency for SJC. The state petitioned USDA to open CRP land to domestic livestock grazing. The petition was granted. Several radio-collared sage-grouse inhabited some of the CRP land in the county that was opened to grazing. Habitat-use patterns of these birds were monitored in response to the presence of livestock. Eleven exclosures (1 m²) were constructed in each CRP field that was grazed. These exclosures will allow an opportunity to assess effects of grazing on future vegetation growth. These data will be available in the spring of 2004.

In addition, 1280 acres that are part of the Adams conservation easement are being managed under a prescribed grazing program to enhance Gunnison Sage-grouse habitat conditions.

Work with the USU County Extension Office and the Utah Department of Agriculture and Food to identify and manage noxious weed species to improve sage-grouse habitat and livestock productivity.

Status: SWOG is working with the USU County Extension Office and the Natural Resources Conservation Service (NRCS) to monitor noxious weed infestation in the county.

Action: **Protect critical lek, nesting, brood-rearing, and wintering areas.**

Strategies: **Secure or acquire important habitats through fee title from willing sellers, land exchanges, conservation easements, tax incentives, voluntary cooperative agreements, CRP leases, grazing lease agreements, etc.**

Status: The UDWR purchased a conservation easement from Bruce Adams (Figure 4). The easement covers 2,244 acres. The total cost of the easement was \$336,600. The Department of Natural Resources, and Endangered Species Mitigation Fund contributed \$182,600 toward the purchase. Other partners included the USFWS (\$99,000), The Nature Conservancy (\$5,000), and an anonymous natural gas pipeline company (\$50,000).

The easement protects the Hickman Flat lek site and important sagebrush cover used by sage-grouse for nesting cover. The BLM has secured an easement agreement with Clay Pehrson to protect the Roring lek site.

5. Reducing Physical Disturbance

Action: **Disturbance that negatively impacts sage-grouse will be identified and managed. This includes predation management, recreation use, construction and surface disturbances, and other uses that may conflict with critical biological periods.**

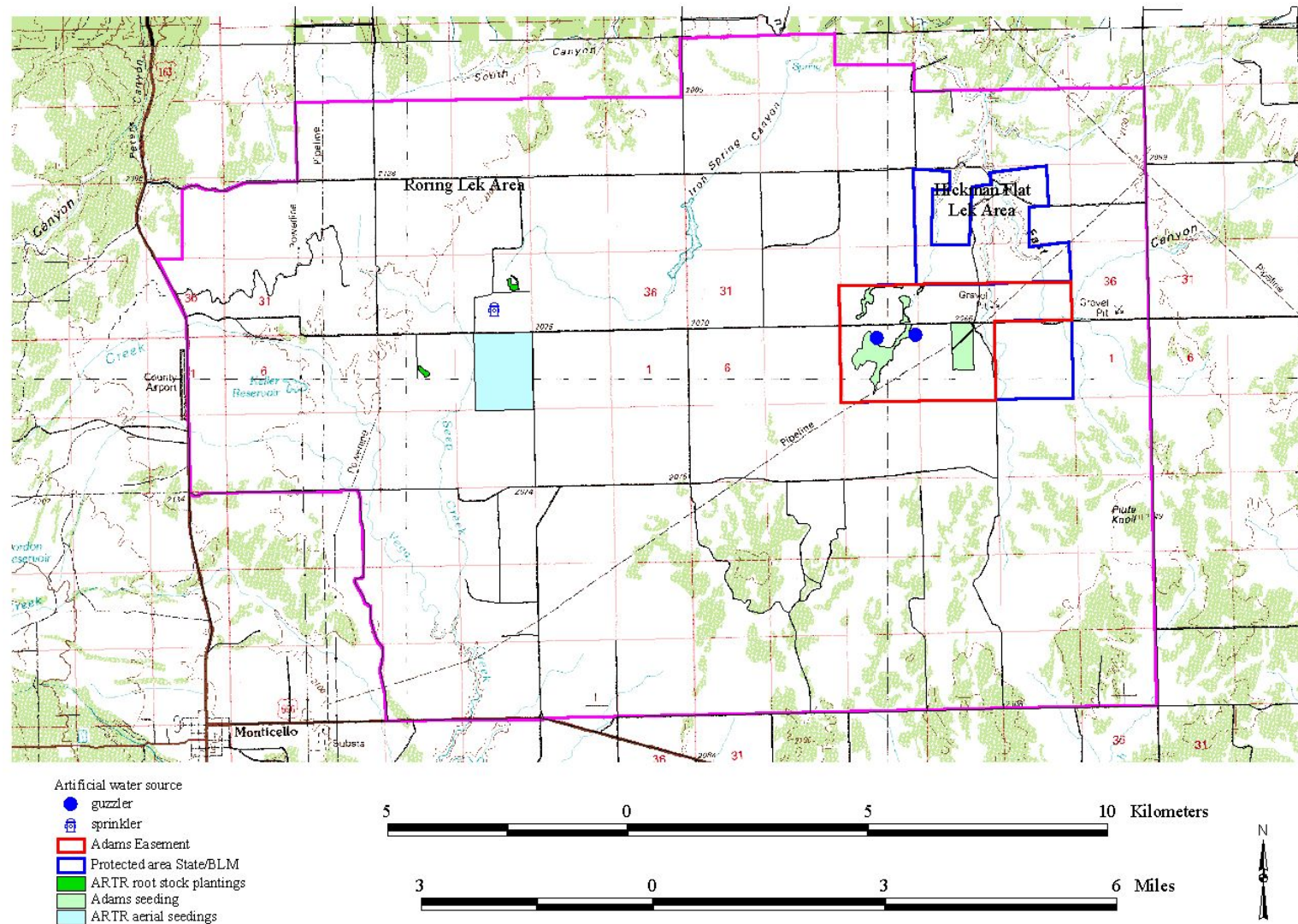
Strategies: **Delay or modify construction start up dates or hours to minimize impacts in sage-grouse nesting and brood-rearing areas.**

Status: When UDWR reviews construction permits or applications for gas, oil, and/or pipeline developments in SJC, it identifies essential Gunnison Sage-grouse habitats and activity periods that the contractors should avoid.

Implement predation management in key nesting, brood-rearing, and wintering areas.

Status: WS is conducting a predation management program during critical periods.

Figure 3. Gunnison Sage-grouse conservation projects, San Juan County, Utah, 2000-2002.



IV. APPENDICES

Appendix A. San Juan County Gunnison Sage-grouse Local Working Group Members

**Bureau of Land Management
Jack H. Berryman Institute
San Juan County Commissioners
Utah State University Extension Office
San Juan County Landowners
The Nature Conservancy
Utah Division of Wildlife Resources
U.S.D.A. Farm Services Agency
U.S.D.A. Natural Resources Conservation Service
Utah State University Extension Service
Utah State University College of Natural Resources
U.S.D.A. Wildlife Services
U.S. Fish and Wildlife Service**

Appendix B. San Juan County Gunnison Sage-grouse Conservation Area Vegetation Classifications and Definitions

1. **Surface Water**--class includes areas of open water.
2. **Wet meadows**--class includes drainages, ephemeral streams, creeks, springs, and other riparian areas. Commonly associated plant species include; *Carex spp.*, *Typha spp.*, *Scirpus spp.*, *Salix spp.*, *Artemisia tridentata*, and other forbs and grasses.
3. **Irrigated agriculture**--class includes irrigated agriculture fields, mainly alfalfa, *Medicago spp.*
4. **Non-irrigated agriculture**--class includes those fields in some sort of dry land farming.
5. **Urban**--class includes urban areas.
6. **Pinyon/Juniper**--class includes those areas where pinyon (*Pinus edulis*) and/or Utah Juniper (*Juniperous osteosperma*) comprise more than 15% of the total vegetation in a given area. Commonly associated plant species include: *Artemisia tridentata*, *Chrysothamnus spp.*, *Quercus gambelii*, *Gutierrezia sarothrae*, *Purshia tridentata*, *Amelanchier alnifolia*, *Opuntia spp.*, *Cordylanthus wrightii*, *Poa spp.*, *Aristida spp.*, *Bromus tectorum*, *Stipa spp.*, *Oryzopsis hymenoides*, *Aster spp.*, and Crypto-gramic crust.
7. **Black Sage**--class includes those areas where *Artemisia nova* is the dominate vegetation. Commonly associated plant species include: *Artemisia tridentata*, *Chrysothamnus spp.*, *Gutierrezia sarothrae*, *Atriplex canescens*, *Opuntia spp.*, *Cordylanthus wrightii*, *Poa spp.*, *Bromus tectorum*, *Agropyron cristatum*, *Agropyron smithii*, *Ceritoides lanata*, *Aster spp.*, and Crypto-gramic crust.
8. **Pinyon/Juniper-mountain shrub**--class includes those areas which contain less than 15% Pinyon pine (*Pinus edulis*) and/or Utah Juniper (*Juniperous osteosperma*) and greater than 25% shrubs. Commonly associated plant species include; *Artemisia tridentata*, *Cercocarpus montanus*, *Chrysothamnus spp.*, *Quercus gambelii*, *Gutierrezia sarothrae*, *Purshia tridentata*, *Amelanchier alnifolia*, *Opuntia spp.*, *Cordylanthus wrightii*, *Ceritoides lanata*, *Wyethia amplexicalis*, *Poa spp.*, *Aristida spp.*, *Bromus tectorum*, *Stipa spp.*, *Oryzopsis hymenoides*, *Agropyron cristatum*, *Agropyron smithii*, *Aster spp.*, and Crypto-gramic crust.
9. **Big Sage >25% canopy cover**--class includes those areas where big sagebrush (*Artemisia tridentata*) is the dominate vegetation type. Commonly associated plant species include; *Chrysothamnus spp.*, *Artemisia nova*, *Gutierrezia sarothrae*, *Atriplex canescens*, *Purshia tridentata*, *Opuntia spp.*, *Cordylanthus wrightii*, *Ceritoides lanata*, *Wyethia amplexicalis*, *Poa spp.*, *Aristida spp.*, *Bromus tectorum*, *Bromus carinatus*, *Stipa spp.*, *Oryzopsis hymenoides*, *Agropyron cristatum*, *Agropyron smithii*, *Aster spp.*, and Crypto-gramic crust.
10. **Big Sage 15-25% canopy cover**--class contains those areas where big sagebrush (*Artemisia tridentata*) comprises at least 15% of the vegetation but not more than 25% of the total vegetation type. In some cases this class may be invading some Conservation Reserve Program (CRP) fields.

Commonly associated plant species include; *Chrysothamnus* spp., *Artemisia nova*, *Gutierrezia sarothrae*, *Atriplex canescens*, *Purshia tridentata*, *Opuntia* spp., *Cordylanthus wrightii*, *Ceritoides lanata*, *Poa* spp., *Aristida*, spp., *Bromus tectorum*, *Bromus carinatus*, *Stipa* spp., *Oryzopsis hymenoides*, *Agropyron cristatum*, *Agropyron smithii*, *Aster* spp., and Crypto-gramic crust.

11. **Big Sage <15% canopy cover**---class contains those areas where big sagebrush (*Artemisia tridentata*) comprises less than 15% of the vegetation in a given area. In some cases this class may be invading some Conservation Reserve Program (CRP) fields. Commonly associated plant species include: *Chrysothamnus* spp., *Artemisia nova*, *Gutierrezia sarothrae*, *Atriplex canescens*, *Purshia tridentata*, *Opuntia* spp., *Cordylanthus wrightii*, *Ceritoides lanata*, *Wyethia amplexicalis*, *Poa* spp., *Aristida* spp., *Bromus tectorum*, *Bromus carinatus*, *Stipa* spp., *Oryzopsis hymenoides*, *Agropyron cristatum*, *Agropyron smithii*, and *Aster*, spp.
12. **Mountain Shrub**---class is dominated by Gambel's Oak. Commonly associated plant species include: *Pinus edulis*, *Juniperous osteosperma*, *Artemisia tridentata*, *Cercocarpus montanus*, *Chrysothamnus* spp., *Quercus gambelii*, *Gutierrezia sarothrae*, *Purshia tridentata*, *Amelanchier alnifolia*, *Opuntia* spp., *Cordylanthus wrightii*, *Ceritoides lanata*, *Wyethia amplexicalis*, *Poa* spp., *Aristida* spp., *Bromus tectorum*, *Stipa* spp., *Oryzopsis hymenoides*, *Agropyron cristatum*, *Agropyron smithii*, *Aster* spp., and Crypto-gramic crust.
13. **Big Sage CRP mixture**---class contains a fair amount of *Artemisia tridentata*, but is still dominated by some sort of CRP seed mixture mainly, *Agropyron* spp., *Bromus carinatus*, and *Medicago* spp. Commonly associated plant species include: *Chrysothamnus* spp., *Gutierrezia sarothrae*, *Poa* spp., and *Bromus tectorum*.
14. **CRP >70% canopy cover**---class is dominated by CRP grasses and forbs, mainly *Bromus carinatus*, and *Medicago* spp. Commonly associated plant species include: *Agropyron cristatum*, *Agropyron smithii*, *Agropyron intermedium*, *Chrysothamnus* spp., *Gutierrezia sarothrae*, *Poa* spp., *Aristida* spp., and *Bromus tectorum*.
15. **CRP 41-70% canopy cover**---class is dominated by CRP grasses and forbs, mainly *Agropyron* spp. Commonly associated plant species include; *Agropyron cristatum*, *Agropyron smithii*, *Agropyron intermedium*, *Bromus carinatus*, *Medicago* spp., *Chrysothamnus* spp., *Gutierrezia sarothrae*, *Poa* spp., *Aristida* spp., and *Bromus tectorum*.
16. **CRP 15-40% canopy cover**---class is dominated by CRP grasses and forbs, mainly *Agropyron cristatum*. Commonly associated plant species include: *Agropyron smithii*, *Agropyron intermedium*, *Bromus carinatus*, *Medicago* spp., *Chrysothamnus* spp., Commonly associated plant *Gutierrezia*, *Sarothrae*, *Poa* spp., *Aristida*, spp., and *Bromus tectorum*.
17. **Rangelands**---class contains various vegetation types but was grazed too close to the ground to allow vegetation to be placed into other classes. Commonly associated plant species include: *Chrysothamnus* spp., *Gutierrezia sarothrae*, *Opuntia* spp., *Cordylanthus wrightii*, *Ceritoides lanata*, *Poa* spp., *Aristida* spp., *Bromus tectorum*, *Stipa* spp., *Oryzopsis hymenoides*, *Agropyron cristatum*, *Agropyron smithii*, and *Aster* spp.

18. **Bare ground**--class contains mainly bare ground and rock where vegetation is less than 15% total canopy cover.
19. **Unknown**--class could not be placed into any of the above classes with the few vegetation training sites collected in November 1997.

Appendix C. Summer Ecology of Gunnison Sage-grouse (*Centrocercus minimus*) in San Juan County, Utah, 2001-2002.

To assess Gunnison Sage-grouse habitat use patterns in the CSA and breeding complex, 14 Gunnison Sage-grouse were captured on or adjacent to two separate strutting grounds during March and April each year (6 in 2001, 8 in 2002). In 2001, all birds (1 hen, 5 males) were adults. In 2002, all the males (3/3) were adults and 60 % of the hens were juveniles (3/5).

Nesting

Three radio-collared hens nested (1 in 2002, 2 in 2002). All of the nests were monitored and each hen successfully hatched a brood. All nests hatched between 21 May and 23 May. Allowing for 26 days of incubation, nests were initiated April 25-27.

The only nest monitored in 2001 was located one mile from the nearest lek site. In 2002, nest sites were one-half mile and one and one-half miles from the nearest active strutting grounds. In 2001, the hen nested in black sagebrush (*Artemisia nova*). In 2002, all the hens nested in agricultural land enrolled in the Conservation Reserve Program (CRP). These lands have been reseeded to grasses and forbs using a seed mixture provided by the UDWR.

Vegetation measured at nest sites was compared to non-use sites in black sagebrush and CRP/grassland cover classes. The vegetation measured at nest sites differed from non-use sites ($P = 0.01$). Nest sites had fewer grasses and forbs than non-use sites, but had more shrubs (Table 1). All nests were located under sagebrush canopies. The average height of sagebrush at the nest bushes was 8.5 inches (21.5 cm).

Table 1. Percent cover of grasses, forbs, and shrubs at Gunnison Sage-grouse nest and reference sites for 2001-2002, San Juan County, Utah.

	Percent Cover		
	Nesting	Reference	Canopy cover objective
Grasses	6.0	34.7*	30%
Forbs	0.5	8.8*	10%
Shrubs	27.5	10.4*	20-40%

* P-value ≤ 0.05 is significantly different

In the late 1980s, many landowners within the CCA enrolled their lands in CRP. Most of the decline in non-irrigated agricultural land can be explained by CRP. In 1993, over 43,000 non-irrigated croplands were converted to CRP grasslands. Also during this period, an additional 10,000 acres of cropland was converted to rangeland.

Many CRP contracts in the county expired in 1995. Based on new national CRP eligibility requirements, many of these lands and other agricultural lands located in the county would not have been eligible for enrollment in the program. SWOG worked with the Natural Resources Conservation Service (NRCS) and Farm Services Agency (FSA) to have SJC designated as a priority conservation area under CRP because of Gunnison Sage-grouse. Designation as a priority conservation area meant that agricultural land submitted for CRP enrollment consideration in the county did not have to meet the CRP erodibility index requirements to be eligible for the program. However, landowners could only qualify for the program if they agreed to implement approved wildlife conservation practices.

As of February 2000, a total of 36,825 acres of private land within the CCA had been enrolled in CRP. Approximately 32,667 acres were enrolled as a result of the Gunnison Sage-grouse priority conservation area initiative. The UDWR, in conjunction with NRCS, developed a sage-grouse seed mixture for use in SJC. The total cost of reseeding these areas was \$531,686. The UDWR and private landowners each paid \$132,921 of this amount. FSA cost-shared for the remaining \$265,844. The total cost of establishing CRP in SJC was \$1,222,728. This includes the seed cost and \$691,042 that was spent to prepare the land for seeding. Half of the costs of land preparation were paid by the landowners (\$345,521) and half was cost-shared by FSA. CRP leases generate in excess of \$1,000,000 in annual income for participating landowners.

The CRP program enabled SWOG to achieve minimum grass and shrub canopy cover objectives in the breeding complex. The forb cover may have been affected by the severe drought conditions SJC experienced in 2002 and grass competition. Some of the CRP lands in the CSA were grazed in 2002 under an emergency grazing declaration. NRCS considered the grazing to be a stand maintenance treatment. SWOG is monitoring these areas to see if the grazing has affected grass and forb communities.

UDWR initiated efforts to both hand plant and aerial seed CRP fields with sagebrush in areas that exhibit high bird use to augment existing sagebrush stands and thus enhance canopy cover. These efforts are discussed in greater detail under Conservation Strategies.

To determine brood habitat use patterns in the CSA, three broods were monitored that nested in the area. In 2001, one hen produced a successful brood. A brood was considered successful if ≤ 1 chick was recruited into the August population. In 2002, one of two broods monitored was successful. In both years, most chicks were lost within the first 14 days post-hatch.

Habitat selection by broods was combined for both years because of sample size limitations. Hens with broods selected CRP/grassland and big sagebrush more than any other cover type (Table 3). Agriculture, black sagebrush, grazed rangelands, and bare ground were not used in proportion to their availability. The woodland/mountain shrub cover class was used in equal proportion to its availability. Black sagebrush was only used in 2001; agriculture and woodland/mountain shrub were only used in 2002.

Table 3. Percent availability and use of cover types by Gunnison Sage-grouse broods, San Juan County, Utah, 2001-2002.

Cover Type	2001			2002		
	Availability	Use	<i>n</i>	Availability	Use	<i>n</i>
Wet meadow	0	0	0	0	0	0
Agriculture	0	0	0	27	11 ^{-a}	2
Woodland/Mtn. shrub	0	0	0	1	5	1
Black sagebrush	85	8-	2	0	0	0
Big sagebrush	3	19+	5	2	11+	2
Grass (CRP)	11	73+	19	25	74+	14
Rangeland	1	0-	0	0	0	0
Bare ground	1	0-	0	0	0	0

^a + = Use greater than availability, no symbol = use in proportion to availability, - = use less than availability ($P \leq 0.0001$) by Bonferroni confidence intervals.

The vegetation composition at brood-use sites in 2001 did not differ from non-use sites ($P = 0.0001$). Brood-use sites exhibited greater forb cover and less grass and shrub cover than non use sites (Table 4). Percent cover of grasses, forbs, and shrubs at brood-use sites did not differ between years ($P = 0.002$). Brood-use sites in 2001 had greater percent canopy cover of all vegetation types (Table 4). Although the vegetation height at brood-rearing sites differed between years, the difference was not significant ($P = 0.07$).

In 2001, we monitored four radio-collared males. All individuals were captured from the Roring lek site. They were often observed in the same flock. Flock size ranged from 2-18 individuals. We observed no mixed-sex flocks in 2001. In 2002, we monitored six radio-collared males and five radio-collared hens that did not have broods. Three of the males were the same individuals monitored in 2001. The other three males were captured on the Hickman Flat lek site. One of the broodless hens in 2002 was the brooding hen from 2001. The other four broodless hens were captured in 2002, three on the Roring lek and two on the Hickman Flat lek. The birds captured on the Hickman Flat lek were observed in mixed flocks while individuals captured on the Roring lek were only found in single-sex flocks. Mixed-sex flocks ranged in size from 4-18 individuals, single sex flocks had 1-16 individuals.

Percent cover of grasses, forbs, and shrubs at brood-use sites in 2001 differed from sites used by radio-collared males in the same year ($P = 0.002$). Sites used by males had greater grass cover than those used by the brood; brood-use sites included those with greater forb and shrub cover (Table 4). The height of vegetation at brood-use sites did not differ at sites used by males in 2001 ($P = 0.06$) (Table 5). Vegetation height did not differ between brood-use sites and sites used by males in 2002 ($P = 0.5$).

In both years, males selected the CRP/grassland and big sagebrush cover types (Table 6). In 2001, agriculture, woodland, and bare ground cover types were avoided; rangelands were used in proportion to their availability. In 2002, wet meadow, agriculture, black sagebrush, and bare ground cover types were avoided; woodlands and rangelands were used in proportion to their availability.

Table 4. Vegetation height (cm and in) and percent cover of grasses, forbs, and shrubs at

Gunnison Sage-grouse brood-use sites, San Juan County, Utah, 2001-2002.

	2001	2002
Height	18.8 (7.8 in)	12.2 (5.1in)
% Grasses	14.8	5.7*
% Forbs	9.5	1.7*
% Shrubs	6.1	2.8*

*P-values ≤ 0.05 are significantly different.

Table 5. The vegetation height (cm and in) and percent cover of grasses, forbs, and shrubs at brood and male Gunnison Sage-grouse locations, San Juan County, Utah, 2001.

	Brood	Males
Height	18.8 (7.8in)	23.6 (9.8in)
% Grasses	14.8	28.3*
% Forbs	9.5	8.1*
% Shrubs	6.1	3.3*

* P-value ≤ 0.05 significantly different.

The percent cover of grasses, forbs and shrubs at sites used by males in 2001 did not differ from reference sites ($P = 0.1$) (Table 6). Reference sites had slightly greater percent cover of grasses, forbs, and shrubs than sites used by Gunnison Sage-grouse males.

The percent cover of grasses, forbs, and shrubs at brood-use sites in 2002 did not differ from sites used by hens without broods ($P = 0.5$) (Table 7). The height of vegetation at brood-use sites in 2002 did not differ from sites used by hens without broods ($P = 0.06$). In addition, percent cover of grasses, forbs, and shrubs at brood-use sites in 2002 did not differ from sites used by radio-collared males ($P = 0.4$) (Table 8).

Hens without broods did not use wet meadow, black sagebrush, and bare ground cover types in proportion to their availability. Agriculture and big sagebrush cover types were used relative to availability (Table 9).

Table 6. Simultaneous confidence intervals using the Bonferroni approach for utilization of vegetation types by male Gunnison Sage-grouse, San Juan County, Utah, 2001-2002.

Cover Type	2001			2002		
	Confidence Interval		Expected	Confidence Interval		Expected
	Lower	Upper		Lower	Upper	
Wet meadow	0.000	0.000	0.000	0.000	0.000	0.001- ^a
Agriculture	0.113	0.215	0.331-	0.036	0.091	0.104-
Woodland/Mtn. shrub	0.000	0.000	0.028-	0.000	0.017	0.003
Black sagebrush	0.000	0.000	0.000	0.099	0.177	0.266-
Big sagebrush	0.092	0.188	0.067+	0.077	0.149	0.055+
Grass(CRP)	0.623	0.751	0.565+	0.561	0.671	0.426+
Rangeland	0.000	0.022	0.009	0.010	0.048	0.020
Bare Ground	0.000	0.000	0.001	0.013	0.014	0.127-

^a + = Use greater than availability, no symbol = use in proportion to availability, - = use less than availability ($P \leq 0.0001$) by Bonferroni confidence intervals.

Table 7. Percent cover of grasses, forbs, and shrubs at reference sites and male Gunnison Sage-grouse locations in San Juan County, Utah, 2001.

	Males	Reference
Grasses	28.3	33.2
Forbs	8.1	9.1
Shrubs	3.3	10.9

Table 8. Percent cover of grasses, forbs, and shrubs at brood, non-brood hen, and male Gunnison Sage-grouse locations, San Juan County, Utah, 2002.

	Brood	Non-brood Hens	Males
Height	12.2	20.1	14.5
Grasses	5.7	3.6	4.0
Forbs	1.7	1.2	2.3
Shrubs	2.8	11.6	3.8

Table 9. Simultaneous confidence intervals using the Bonferroni approach for utilization of vegetation types by non-brood Gunnison Sage-grouse hens, San Juan County, Utah, 2002.

Cover Type	Confidence Interval		Expected
	Lower	Upper	
Wet meadow	0.0000	0.0000	0.0007 ^{-a}
Agriculture	0.0372	0.1098	0.0743
Woodland	0.0000	0.0247	0.0017 ^{+b}
Black sagebrush	0.0734	0.1633	0.2964-
Big sagebrush	0.1008	0.2004	0.1444
CRP/grassland	0.5361	0.6722	0.4402 ^{+b}
Rangeland	0.0147	0.0712	0.0091
Bare ground	0.0000	0.0000	0.0333-

^a - = use less than availability, no symbol = use in proportion to availability ($P \leq 0.0001$) by Bonferroni confidence intervals.

^b + = use greater than availability ($P \leq 0.05$) by Bonferroni confidence intervals.

Appendix D. Summary of 2000-2002 Gunnison Sage-grouse Conservation Projects and Costs

Project	Location	Acres	Cost \$	Status
---------	----------	-------	---------	--------

Livestock Watering Facility Pipeline	Adams Conservation Easement	N/A	3,151	Completed
Electric/Conventional Fencing for Livestock Exclusion	Adams Conservation Easement	N/A	20,034	Completed
Brush Management/ Rabbit	Adams Conservation Easement	150	1,800	Completed
Prescribed Grazing	Adams Conservation Easement	1,280		Completed
Prescribed Grazing	Adams Conservation Easement	640	2004	
Livestock Watering Facility Solar Pump	Adams Conservation Easement	N/A	1,744	Completed
Livestock Water Development and Tanks	Adams Conservation Easement	N/A	3,244	Completed
Range Planting	Adams Conservation Easement	100	1,703	Completed
Upland Habitat Improvement	Adams Conservation Easement	2,240		Ongoing
Wildlife Guzzlers	CSA	N/A	1, 800	Completed
Brush Management	Adams Conservation Easement	240	7,600	Completed
Range Planting	Adams Conservation Easement	240	4,258	Completed
Rabbitbrush Management	Adams Conservation Easement	80	1,722	2004
Range Planting	Adams Conservation Easement	80	1,022	2004
Conservation Reserve Program	CA	36,825	1,222,728	Completed
Conservation Easement	Adams Property	2,244	336,600	Completed
Conservation Easement	Pehrson Property	320	57,600	Completed
Solar Pump	Pehrson Property	--	--	Ongoing
Sagebrush Planting	Roring Property	5		Completed
Sagebrush Planting	Sinner Property	5		Completed
Sagebrush Planting	Randall Property	5		Completed